FAA AVIATION NEWS

FEBRUARY 1969

COVER

No need to tuck your airplane away for a long winter snooze when the snow flies. But if you go flying when the mercury dips, don't try it in your shirtsleeves. For a warning on windchill, see page 6.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION / **FEDERAL AVIATION ADMINISTRATION** VOL. 7 NO. 10

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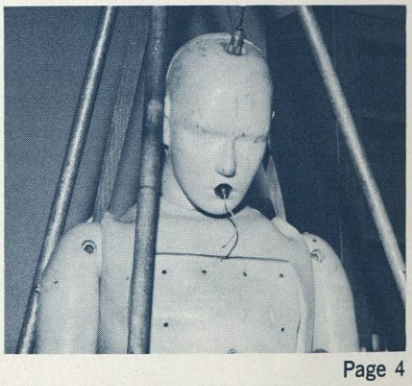

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FAA AVIATION NEWS is published by the Office of Information Services, Federal Aviation Administration, Washington, D.C. 20590, in the interest of aviation safety and to acquaint readers with the policies and programs of the agency. The use of funds for printing FAA AVIATION NEWS was approved by the Director of the Bureau of the Budget, July 14, 1967. Send change of address to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, with a mailing label from any recent issue. Single copies of FAA AVIATION NEWS may be purchased from the Superintendent of Documents for 20 cents each.

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COLOR IT GREEN

Landscaping as well as modern construction improve the airport image

These blazing white concrete "umbrellas" are typical of the imaginative design and architectural flair marking Guam International Airport's new terminal. Gone but not lamented are the dingy, ramshackle quonset huts which served as Guam's terminal since WW II.

Two mid-west general aviation airports, and Guam International Airport, are the newest additions to the growing list of air facilities to win recognition in the Federal Aviation Administration's year-old airport beautification program. Nine other airports have been similarly honored.

Cuyahoga County Airport, 10 miles northeast of Cleveland, underwent a transformation that involved local governments, industry and individual citizens—all pitching in to transform it from a merely functional airport to one of distinctive esthetic appeal.

Working within a very limited budget, a voluntary committee that included horticulturists, nurserymen, landscape architects, county and city officials, and members of the aviation community, set up a master plan for overall improvement.

The goal was to convert the airport's commercial appearance to the natural look of a park. This was accomplished by large-scale planting of shrubbery, flowers and trees, installation of a flag pole and drinking fountain at the airport entrance, regulating building design and construction, relocating power lines underground, and screening off unsightly areas.

Trees, shrubs and flowers were the key ingredients in the beautification program that earned an award for Southern Illinois Airport, located three miles northwest of Carbondale and three miles northeast of Murphysboro.

Airport officials screened off work areas with an attractive 12-foot high metal fence, relocated the parking lot, and installed a putting green for visitors and pilots in the center of the circular drive directly in front of the new two-story terminal building now under construction.

A new terminal building of striking beauty was a major factor in earning Guam International Airport an award. The occasion marked the first time that an FAA beautification award has been granted outside the continental United States. The tropical white reinforced concrete structure replaced a World War II quonset hut and was designed to withstand the hot climate and periodic typhoons. Anodized aluminum jalousies provide ventilation, sun-control and security. Constructed to allow for expansion, the three-part structure consists of an arrival, immigrations and customs building, and a departure building separated by a concrete "umbrella" which shelters a public concourse.

The Airport Beautification Program was launched in response to a White House desire to introduce a conscious concern for the values of beauty into public planning and building.

The program provides an incentive for long-range appearance improvements and immediate, low-cost face-lifting activities that will portray airports as keystones of civic pride and hospitality.

To be eligible for an award, the "beautified" airport must have been significantly improved in at least one of the following areas: 1) landscaping, with special emphasis on planning noise-absorbing shrubbery and screening unsightly areas; 2) pavement and fencing, with particular attention to improving the appearance of parking areas, access roads and other easily observable areas; 3) maintenance, with emphasis on anti-litter measures; 4) architecture, specifically, restoration of old buildings, including painting, structural repairs, and elimination of dangerous aerial wires; and 5) miscellaneous projects that might include construction of special exhibit halls to stimulate interest in aviation.

Any American airport can be nominated for consideration for an award in FAA's airport beautification program. An informational brochure, describing the program and containing an application form, is available without charge from Special Projects Division, Office of Information Services, FAA, Washington, D. C. 20590. Each nomination must identify the airport, its age, location, type (commercial/general aviation), and the name and address of owner and operator. In addition, a detailed description of the accomplishments achieved must be provided and should indicate the degree of community participation.

Entries must be accompanied by black and white or color photographs. Nominations must be submitted within one year after completion of improvements. ■

WALKING AWA

The leather helmet-and-goggles-set had a phrase, "a good landing is one you can walk away from."

The jet age has slimmed that commentary down to one word—*crashworthiness.*

Surviving a crash is one of today's positive approaches to air safety. A growing body of knowledge is accumulating on what it takes to reduce the hazards of an aircraft accident.

At the National Aviation Facilities Experimental Center and at the Aeronautical Center, Federal Aviation Administration technical teams are dedicated to the notion that survivable accidents should have survivors. Yet a six-year study of survivable crashes, where impact was not of fatal force, shows that 270 passengers perished due to flames, smoke or carbon monoxide.

The FAA concern in this area of safety is directed towards a miniscule target. The scheduled airlines' ratio of passenger miles to fatalities is better than 250 million to one. Compared to driving on the highways or boating on the waterways, for example, flying the airways is statistically far and away the safest way to travel.

As one experienced traveler puts it: "My wife and I used to drive to the airport together, then take separate planes to our destination. Now, after reading highway safety statistics, we drive to the airport separately and fly together."

Despite the fractional segment of the flying public apt to benefit from its crash survivability program, FAA believes that reducing any and every risk of commercial air travel is an implicit responsibility of its safety-of-the-airways-mission. In this respect, the agency has the full cooperation and support of the airlines, the Civil Aeronautics Board and the National Transportation Safety Board.

While no one connected with aviation ever takes a holiday from safety, the twin challenges of airworthiness and crashworthiness have recently come under renewed scrutiny because of the new generation jets soon to take to the airways.

Harold D. Hoekstra, Chief of the FAA Aircraft Development Services' Engineering and Safety Division, sums up the size of the crash survival problem this way: "To insure safety with larger aircraft carrying greater amounts of fuel and more passengers, operating at take-off and landing speeds certainly no less than present aircraft, operating into adverse weather with increasing pressures for schedule reliability —that's the measure of the challenge confronting us."

In a recent presentation to the RAND Corporation in California, Hoekstra described crashworthiness from the point of view of the passenger.

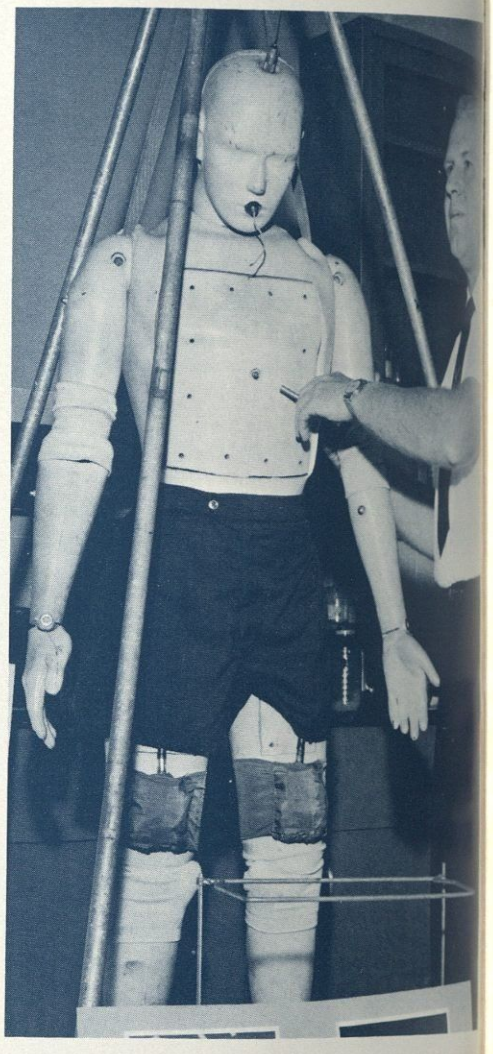
"Success in crash survivability depends on our ability to satisfy four requirements: (1) keep the occupant conscious and mobile; (2) provide space at the seat and a pathway from it to a readily available exit; (3) provide signs, illumination and guidance as needed to facilitate egress; and (4) prevent or delay the onset of fire and smoke."

Hoekstra feels that the importance of the last requirement can't be overemphasized. Other safety experts endorse this position. "Stop the fire," they say. "All crashworthiness efforts are subordinate to this objective."

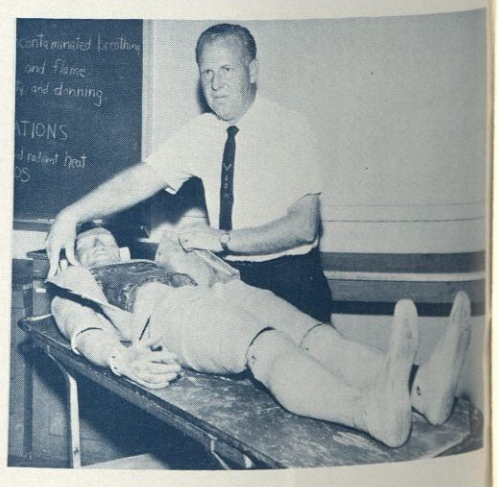
From the point of view of the aircraft—its design, construction and use—crashworthiness compels attention to three critical systems: evacuation systems, fuel systems and structural system. Evacaution capabilities involve not only clearing the aircraft rapidly (one of the specifications for new transports, including the giant Boeing 747, for example, is the demonstrated ability to empty the plane in 90 seconds), but also suppressing cabin fire and controlling smoke sufficiently to assure the mobility of passengers. Fuel systems are important since they are the prime source of fire. And structural systems contribute significantly to crashworthiness since an intact airframe, proper load design, and adept management can cushion the effects of a "hard landing" considerably.

All of these vital systems have been getting the prompt and professional attention of government and private safety organizations. Despite the greater weights and increased complexity of new aircraft, the prospects for substantial product improvement in terms of crash survivability are considered promising.

Following the establishment of a Crashworthiness Task Force in 1967 (headed by James Dougherty, Flight Standards Service) FAA has assembled a library of data and engineering information on speeds, loads, pressures and other indices of value pertinent to crashworthiness. Sub-scale fuselages along with seats and cabin structures have been subjected to impact testing to help determine where strength can be added at little or no weight penalties. New FARs providing improved safety have been



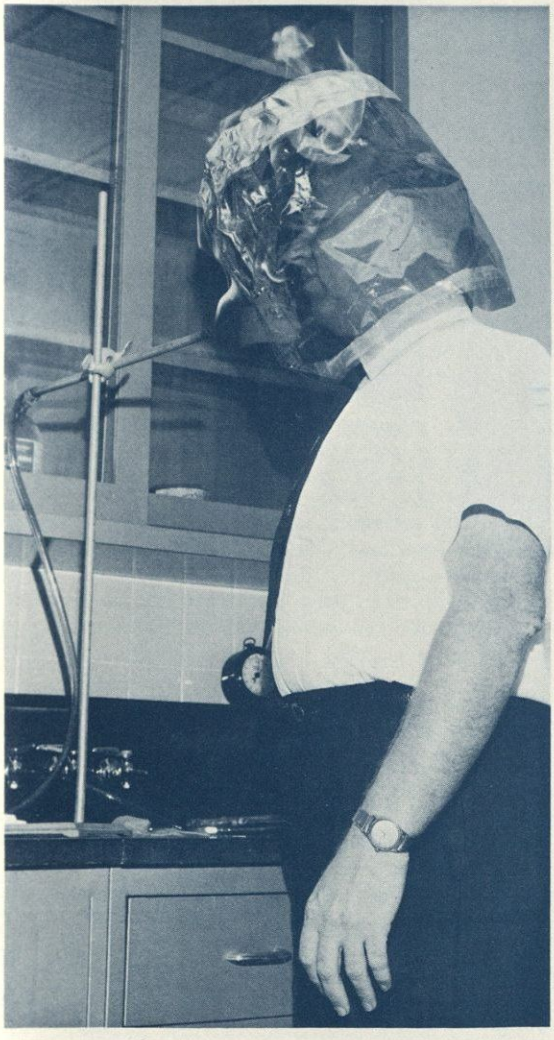
Above—FAA survival expert E. B. McFadden with an anthropomorphic dummy used in immersion tests. Antenna on skull transmits telemetered data from transmitter in chest to boat or shore-based monitors. **Below**—McFadden shows radio in dummy's "chest."



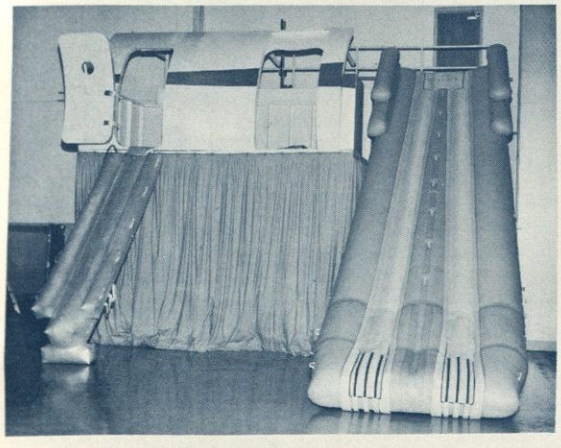
FROM THEM

Harold Hoekstra

James Dougherty



Above—experimental plastic smoke hood can withstand temperatures up to 1,472°F before charring. **Below**—latest model inflatable escape chute **(r.)**, designed for Boeing 747, has safety patches on the bottom to slow passenger slide and prevent injury.



adopted and others are in preparation.

Fast, efficient evacuation of the aircraft becomes especially important with the advent of the high capacity passenger liners. For the first time, manufacturers are building airplanes with doors that are bigger and wider than ever before.

As is often the case, the alleviation of one problem poses other new ones. For example, the 110-pound stewardess is not exactly a match for a 3½ by 6 foot door built to withstand a total air pressure of 15 tons. This means that some form of stored-energy power assist must be provided. It must also be protected against inadvertent use. Other fast exit aids are being examined.

Along with evacuation assists—which include such things as duplicate emergency lighting systems and automatically deployed slides—shoulder harnesses, inflatable bags and other restraining devices to minimize impact injury are possible means of complying with FAA rules. These require the airplane to be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing.

While the integrity of structural systems and the effectiveness of evacuation systems are significant in measuring the crashworthiness of an airplane, fire prevention and smoke control still promise the biggest life-saving dividends.

There is an obvious importance in making aircraft interiors fire resistant and minimizing the smoke generated by those materials that do burn. But these difficult problems are compounded by a pair of contradictions.

For example, the best way to reduce smoke is to make combustion as complete as possible; yet the real safety urgency calls for inhibiting combustion.

Similarly, many materials which burn readily produce little smoke, while those difficult to burn generate considerable smoke.

Despite such dilemmas, extensive exploratory work conducted by FAA, the National Bureau of Standards, and industry has been illuminating and it now appears that smoke-generating limitations can be developed for many interior materials.

As another approach to the smoke hazard, FAA has developed a protective passenger smoke hood, made of relatively inexpensive, lightweight, transparent polyimide film which has a long shelf life and can be stored without deterioration. In hood tests at FAA's Civil Aeromedical Institute, charring did not occur until temperatures exceeded 1,472°F. The hood, which could be stowed aboard aircraft like present-day oxygen equipment, not only protects against flames and smoke inhalation, but guards the eyes, face and hair from injury or disfiguration.

The primary value of the hood, however, is the extended escape time it would provide if applied promptly in any fire-risk situation.

Crashworthiness programs are exploring two basic means of curbing the fuel fire itself—cutting off the source of supply. One possibility is crash-resistant tanks. Another is the use of so-called safety fuels.

FAA, the military, and industry have been exploring techniques for minimizing fuel spillage in the event of an accident. Among other suggestions, puncture-resistant fuel tanks, quick-closing valves, and special liner materials have been examined. (One of the liners that has been tested, with some success, is a foam filler which acts as a "sponge" inside fuel tanks. This polyurethane foam appears able to quench or inhibit a flame resulting from vapor ignition, such as might occur should JP-4 suddenly spurt from a ruptured tank. Use of the foam in the tank reduces usable fuel volume only about two per cent.)

Although various fuel system tests are continuing, FAA's Flight Standards Service has already ruled that main power cables must be able to accept reasonable deformation and stretching without failure and they must be isolated from flammable fluid lines. Fuel lines in the fuselage must also tolerate reasonable stress without leaking. Safety fuels represent an attractive but elusive goal. Since 1948, FAA has been eyeing the properties of thixotropic or "gelled" fuels.

Thickened fuels are safer in at least three ways. First, vaporization is reduced, since there is far less dispersion of the fuel on impact. Secondly, the tendency of the fuel to atomize on impact is much less. And third, the fuel tends to break into discrete "globs," rather than flow freely, and therefore flames do not spread as rapidly.

There are, however, severe production, storage, handling and performance problems which must be solved before we get to the "jello" stage of aircraft fuels.

The long-range goal of FAA safety hunters is to eliminate crashes altogether. Within the limits of the national resources allocable to aviation, the agency is working to achieve the highest possible level of safety in the shortest possible time.

Crashworthiness is not a "crash" program within the FAA. At the moment, there is no end in view nor any Utopia in sight. But the program will continue. For just as safety is no accident to those who work at it, neither is surviving the crash a matter to be trusted to luck.

—John Demeter

How Strong it Blows
How Low it Goes

WINDCHILL

Above—the crew survived this serious crash, thanks in part to adequate cold weather gear. **Left**—happiness for winter flyers means weatherproof outer garments, stout footgear and gloves.

The human skin is probably one of the most ingenious devices ever invented for protection against environmental changes. It has enabled man to flourish from pole to equator. Nevertheless, the shirtsleeve pilot who goes flying in the wintertime with little more protection than that he was born with is inviting trouble. Many a pilot who has survived a forced landing has suffered severe and even fatal effects of exposure because he underestimated the need for shelter against cold.

Even where the temperature never falls below the freezing point, prolonged exposure to cold can be very serious. The actual thermometer reading alone is not the decisive factor; loss of body heat is also affected by the passage of air around the body. Relatively mild temperatures, when coupled with high winds, can carry off warmth *faster than the human being can replace it*. There is a limit to the length of time any human being can withstand such exposure.

For example, it has been calculated that when the air temperature is 40°F. (well above the 32° freezing point), a wind velocity of 40 mph will produce a *windchill* equivalent to a temperature of 10°F. in calm air, assuming equivalency of moisture.

Similarly, a 40 mph wind, coupled with a 20°F. reading will produce the equivalent of 20° below zero in still air. The same wind velocity in conjunction with a --20°F. thermometer reading would create exposure conditions equivalent to 85° below zero—an extremely intense cold for human life. This circumstance is not at all a rare occurrence. A windchill factor of 75° below zero was reported at the site of the recent air carrier crash in Alaska when 39 persons were lost.

Effects of Exposure

While it is true that at actual temperatures above 32°F. flesh will not freeze regardless of wind velocity, the windchill or loss of body heat may have serious consequences. Military researchers have estimated that the heat loss of exposed flesh in a 40 mph wind, with the air temperature at 40°F. is approximately 1,000 kilogram calories per square meter of skin per hour. When you consider that the daily caloric intake of persons on a reduced diet may be less than 1,000 calories per day, the severity of such exposure becomes obvious.

Few pilots may expect to expose a square meter of skin to the elements after a forced landing, but unfortunately, some pilots will fly over terrain where the ground temperature is below freezing without equipping themselves with protective clothing, such as windbreakers, boots and gloves. Ten minutes of exposure to zero degree weather under breezy conditions will cause frostbite to any exposed flesh (ears, face, fingers).

Many persons are frostbitten without immediately knowing it, but no one ever forgets the recovery experience. At the very least, the recovery is accompanied by intense pain; at the worst, it means loss of fingers, toes or other affected areas. Frostbite involves freezing or crystalization of water in the skin or of subcutaneous tissue fluids. The only cure is warmth, followed by the restoration of circulation and feeling; if the crystalization is not reversed in time, the affected skin or tissue dies.

For frostbitten limbs, the ideal restorative is immersion in warm water. Frozen boots or gloves should not be removed before this measure is taken. However, it must be remembered that time is a key factor; any suitable source of heat which will not burn the flesh should be applied immediately. Frostbitten skin is extremely sensitive and must be handled gently. The use of rubbing or abrasion for restoring warmth is definitely harmful and of little value. Rubbing the skin with snow or ice or cold cloths is a false bit of folklore which will certainly worsen the condition.

Prevention of frostbite involves sheltering the entire body from exposure. Lightweight skiing parkas, with hoods which protect most of the face, are ideal flight jackets in wintertime—and they should be *worn* or conveniently placed, not stowed where they cannot be retrieved when the aircraft must be abandoned quickly. Gloves or mittens should be tucked in the pockets, and wool socks and waterproof boots should enclose the feet.

These few items of clothing can make all the difference between a brief period of inconvenient delay on the one hand, and serious injury to health from exposure on the other. The primary immediate concern of the pilot down in an uninhabited area in severe weather is to protect himself against the weather; normally he will be located by search and rescue teams in a matter of hours. If overtaken by nightfall, he should try to construct a shelter of brush and deadwood, and of course a fire. His aircraft, if it has not burned, may be used as a shelter in an emergency. However cramped the cabin, it may at least protect occupants from the bite of the wind. If one is so unfortunate as not to be located soon by rescuers, the ability to seek help (assuming no injuries) will depend largely on the type of outer clothing being worn. When adequately clad, persons have walked 50 miles without ill effects. If in shirt sleeves, one may be frostbitten before taking 50 steps away from the airplane.

Injuries from Damp Cold

Other cold injuries that occur when the temperature is above freezing but below 50°F. are chilblains (inflammation of skin), immersion foot and trench foot. All three are associated with exposure to cold, damp air or cold water. Immersion foot is a condition that may affect a pilot forced down over water and partially immersed in chilly water for 12 hours or longer. Circulation of blood in his legs is reduced, and the supply of oxygen to the tissues is diminished. In time, death of the tissues may occur, with eventual loss of limb. Trench foot (also involving impaired circulation) is usually associated with slogging around in swamps or standing in cold puddles. Vigorous use of the legs helps to prevent the onset of this ailment, which can result in unpleasant ulcerations.

The U.S. Air Force recommends that airmen wear at least three layers of clothing in wintry areas. The first layer, next to the skin, should be loose-fitting wool (the best woven material for heat retention), loose twill, cotton, or quilted thermal underwear. Looseness is stressed because tight-fitting garments restrict the all-important circulation of blood.

The inner garment should be cuffed at the neck, wrists and ankles to retain warmth. The second layer should be a medium weave, medium weight one or two-piece garment—again not tight-fitting. The outer layer should be wind resistant, like nylon, and must include a hood. Clothing that will protect windchill should not be water-proofed or rubberized. Material which does not "breathe" may soak the wearer in perspiration during active periods, and the imprisoned dampness will add to his discomfort.

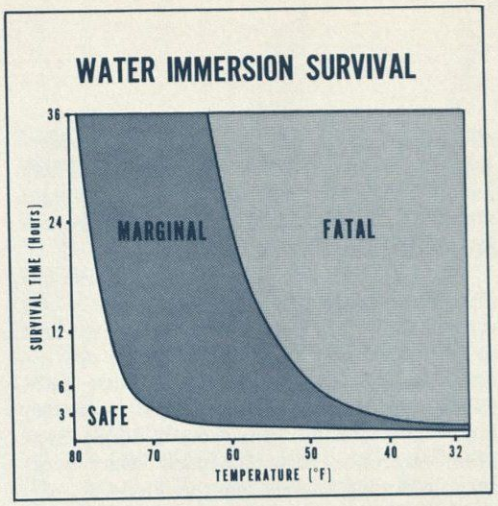
For working around an aircraft in cold weather, a light nylon glove worn under a heavy glove or mitten is recommended. This permits the nylon gloved hand to be used for careful work with frozen metals without risking skin damage.

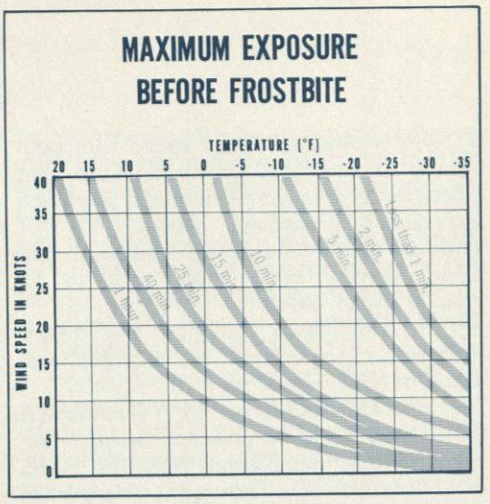
Paradoxical as it may sound, it is possible to become both frostbitten and badly sunburned at the same time. Skin creams can do double duty in protecting sensitive areas like the lips, nose, ears and cheeks from intense sun, while also reducing exposure to cold.

Winter sun can also be a hazard to the eyes, especially if there is snow on the ground. A good pair of sunglasses should be placed in the upper pocket of the parka and kept there in a case; forced landing could easily damage or destroy the glasses worn while flying, and snowblindness could hamper a downed pilot's efforts to remain alive and comfortable until rescued.

In theory, a man trained to survive under rigorous conditions could provide himself with virtually all of the shelter he needed from the materials found at hand in the area where he lands. But the fact is that the great majority of pilots are not so trained, and although one tends to learn fast under conditions of stress, there is no reason to make survival contingent on luck, labor or ingenuity. The thoughtful pilot who *wears* his basic sheltering equipment can fly with much greater ease of mind than the shirt-sleeved, carefree airman who closes his eyes and relies on good luck rather than on good sense. ■

An excellent source of survival—in the desert, in the arctic, at sea or even on ice-floes—is U.S. Air Force AFM 64-5, "Search and Rescue Survival," available for $1.00 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.





COOLING POWER OF WIND ON EXPOSED FLESH

ESTIMATED WIND SPEED (MPH)	ACTUAL THERMOMETER READING (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	EQUIVALENT TEMPERATURE (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-21	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
	LITTLE DANGER (for properly clothed person)				INCREASING DANGER			GREAT DANGER				
	DANGER FROM FREEZING OF EXPOSED FLESH											

(Charts reproduced from TAC ATTACK, Nov. 1968.)

Using the new IFR approach charts pilots may cont
the prescribed decision height is reached, when the

Lowdown o

New IFR Charts Give Pilots

● FAA is moving rapidly ahead with publication of new IFR approach charts that reflect recent changes in terminal approach and takeoff procedures. About 700 IFR approach charts have been revised and published, leaving some 2,000 still to be brought up to date.

The new charts embody five major changes of importance to all IFR and would-be IFR pilots:

(1) ELIMINATION OF WEATHER CEILINGS as the determining factor in deciding whether approaches could be made. Previously, you could not begin an approach unless reported weather was above published ceiling/visibility minimums. Now, when the reported visibility is at or above the published minimums, you may continue a precision instrument approach (full ILS) until you reach the prescribed *Decision Height* (DH). If then you have the runway environment in sight, you may continue and land.

For non-precision approaches (circling or straight-in approaches using a VOR, VORTAC, non-directional radio beacon), follow the same principle, except that you may not descend below the *Minimum Descent Altitude* (MDA) without being able to identify approach lights at the runway threshold or runway markings.

The "Decision Height"

The DH normally approximates the old precision approach ceiling criteria for straight-in precision approaches, and the MDA approximates the old non-precision (VOR and NDB) ceiling minimums for either straight-in or circling approaches. Decision Height and Minimum Descent Altitude are now published as *altitudes above mean sea level,* and there have been some minor adjustments for individual airports. Since many instrument approach procedure charts remain to be updated, users must add the airport elevation (above MSL) to the ceiling minimums printed on the old charts to determine DH or MDA.

(2) STANDARD TAKEOFF MINIMUMS. Previously, criteria were published for each airport with both ceiling and visibility notations. Now ceiling minimums are not required unless there are obstacles in the vicinity of the airport calling for special consideration. There is a visibility standard of one statute mile for aircraft with one or two engines, and one-half statute mile for aircraft with three or more engines. At some airports where obstacles to flight are present, nonstandard or specific takeoff procedures are or will be presented. The old ceiling and visibility minimums previously prescribed will apply until an individual procedure is re-issued in the new format.

(3) STANDARD ALTERNATE AIRPORT ceiling and visibility minimums are still expressed for all aircraft. Unless otherwise noted in the charts, they are: 600 feet and 2 miles for precision approaches and 800 feet and 2 miles for non-precision approaches.

(4) STANDARD TABLES for calculating the increase in MDA or DH when components of a precision approach system or visual landing aid system is not operating. These increases previously were published on individual charts as footnotes. Now they are published on a single separate reference table for each chart book area, reducing clutter on the chart.

(5) NEW AIRCRAFT APPROACH CATEGORIES based on actual *approach speed and weight* instead of engine and speed characteristics. They are:

A. Under 91 knots (105 mph), and under 30,001 lbs.
B. Under 121 knots (139 mph), and under 60,001 lbs. (over 30,001).
C. Under 141 knots (162 mph), and under 150,001 lbs. (over 60,001).
D. Under 166 knots (192 mph), and over 150,001 lbs.
E. Over 166 knots and any weight.

Since the lowest weight category limit of 30,001 lbs. includes most general aviation aircraft, Category A will be generally applicable unless the approach speed is greater than 90 knots. Again, until the charts are revised the aircraft categories published in the old charts are to be followed.

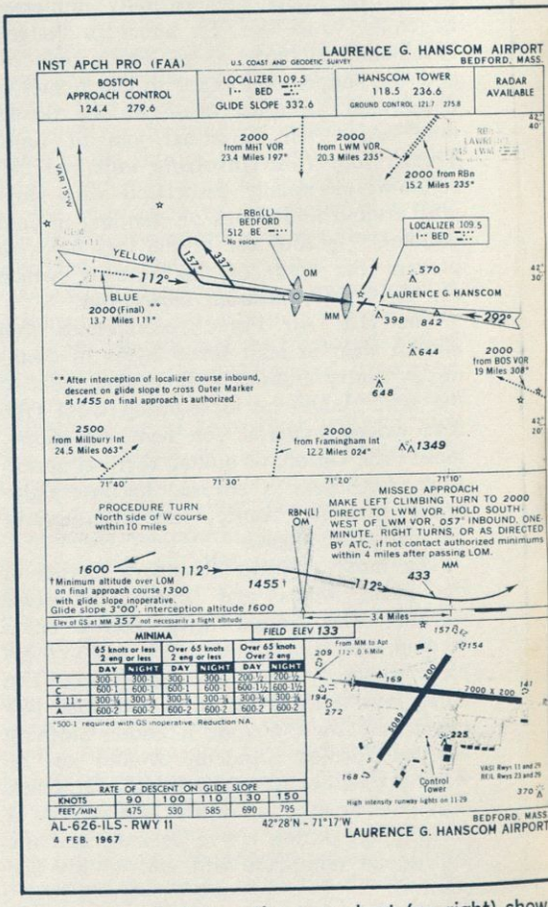
The side view (profile) diagram on the new charts reveals several improvements. The frequencies for approach radio communications facilities are no longer boxed across the top, but are listed vertically in the upper left-hand corner. The side-view (profile) diagram of the letdown procedures has been reduced in width, and the airport diagram space has been upended.

The net result is more free space, which has been used to give the minimums table —already simplified because of TERPS— more white space, and to provide more room for the plan-view letdown diagram. It's here that some of the most helpful changes have been made.

More NAVAIDS Included

The new plan-view includes all navigation facilities which may be involved in the approach, regardless of distance from the destination airfield. The old charts did not provide full information on those facilities which, when charted to scale, were outside of the plan-view map. Depicting out of scale facilities should ease considerably the transition from enroute IFR charts to letdown plates during the portion of a flight when pilots are very busy in the cockpit.

Old and new charts for an ILS approach to Runway 11 at Lawrence G. Hanscom

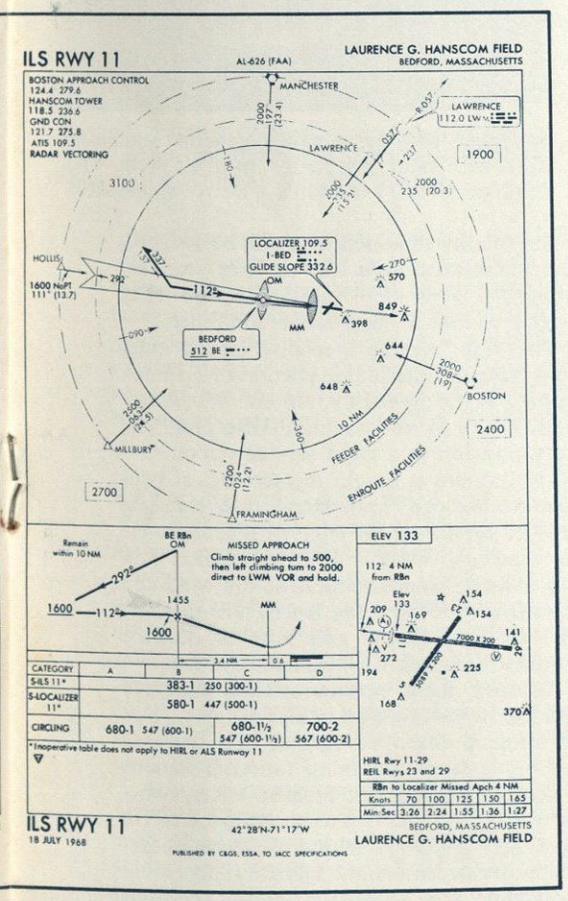

INST APCH PRO (FAA)
LAURENCE G. HANSCOM AIRPORT
BEDFORD, MASS.
U.S. COAST AND GEODETIC SURVEY
BOSTON APPROACH CONTROL 124.4 279.6
LOCALIZER 109.5 I·· BED
GLIDE SLOPE 332.6
HANSCOM TOWER 118.5 236.6
GROUND CONTROL 121.7 275.8
RADAR AVAILABLE
2000 from MHT VOR 23.4 Miles 197°
2000 from LWM VOR 20.3 Miles 235°
2000 from RBn 15.2 Miles 235°
RBn(L) BEDFORD 512 BE
No voice
LOCALIZER 109.5 I·· BED
YELLOW
112°
BLUE
2000(Final) ** 13.7 Miles 111°
OM
MM
LAURENCE G. HANSCOM
292°
** After interception of localizer course inbound, descent on glide slope to cross Outer Marker at 1455 on final approach is authorized.
2000 from BOS VOR 19 Miles 308°
2500 from Millbury Int 24.5 Miles 063°
2000 from Framingham Int 12.2 Miles 024°
1349
PROCEDURE TURN
North side of W course within 10 miles
MISSED APPROACH
MAKE LEFT CLIMBING TURN TO 2000 DIRECT TO LWM VOR. HOLD SOUTHWEST OF LWM VOR 057° INBOUND, ONE MINUTE. RIGHT TURNS, OR AS DIRECTED BY ATC. If not contact authorized minimums within 4 miles after passing LOM.
RBN(L) OM
1600
† Minimum altitude over LOM on final approach course 1300 with glide slope inoperative.
Glide slope 3°00', interception altitude 1600
1455†
433
3.4 Miles
Elev of GS at MM 357 not necessarily a flight altitude
MINIMA
FIELD ELEV 133
65 knots or less 2 eng or less
Over 65 knots 2 eng or less
Over 65 knots Over 2 eng
DAY NIGHT DAY NIGHT DAY NIGHT
T 300-1 300-1 300-1 300-1 200-½ 200-½
C 600-1 600-1 600-1 600-1 600-1½ 600-1½
D 300-¾ 300-¾ 300-¾ 300-¾ 300-¾ 300-¾
A 600-2 600-2 600-2 600-2 600-2 600-2
*300-1 required with GS inoperative. Reduction NA.
RATE OF DESCENT ON GLIDE SLOPE
KNOTS 90 100 110 130 150
FEET/MIN 475 530 585 690 795
From MM to Apt 209 112° 0.6 Mile
7000 X 200
Control Tower
VASI Rwys 11 and 29
REIL Rwys 23 and 29
High intensity runway lights on 11-29
AL-626-ILS-RWY 11
4 FEB. 1967
42°28'N - 71°17'W
BEDFORD, MASS
LAURENCE G. HANSCOM AIRPORT

Concentric circles on the new chart (on right) show
the entire chart were drawn to scale. Only the inner

inue a precision instrument approach (full IFR) until reported visibility is above published minimums.

n Letdowns

More Options in Bad Weather



facilities which would lie beyond the approach area if ring area conforms to scale.

Field, Bedford, Mass., are shown for comparison. Notice the addition of the holding pattern on the new chart, with outbound and inbound legs marked for the Lawrence VOR. Also, note that the enroute and feeder fixes have been pulled into the plan-view presentation, which occupies a greater portion of the 5x8 inch chart than formerly.

The minimums portion of the Hanscom Field chart shows identical precision approach minimums for all categories of aircraft with full ILS, and a Decision Height of 383 feet (MSL) and one mile visibility. The figure 250 indicates actual height of the DH minimum above the touchdown zone. The figures in parentheses are for military pilots only. With localizer-only approaches (with the glide slope inoperative), the Minimum Descent Altitude is 580 feet with one mile visibility, and the actual height of the MDA above the touchdown zone is 447 feet.

The circling minimums vary with aircraft category, but for general aviation types, it would be a Minimum Descent Altitude of 680 feet with one mile visibility.

The small "T" in the solid triangle in the remarks portion of the new chart, lower left-hand corner, shows that the takeoff minimums for Hanscom are *not* standard, and that a special departure procedure has been published. The pilot should refer to the separate listing in the front of his appropriate area letdown chart book.

An "A" in the solid triangle in the remarks section would indicate that the standard alternate airport minimums do not apply, and the separate listings at the front of the area letdown chart book should be consulted.

The Aerodrome Sketch (lower right) section of the new chart has been cleaned up in order to make important data stand out better. The terminal area contrast has been reduced, some words have been eliminated, and some additional information given. For example, the field elevation at the threshold of the ILS runway is now given when different from the field elevation. The encircled A_1 indicates the type of approach lights.

The convenient table at the bottom of the sketch gives time and speed from the Final Approach Fix to the missed Approach Point for a localizer approach.

Using the New Chart

During preflight planning prior to departure on an IFR flight, a pilot should check the instrument approach chart for takeoff minimums. He also checks the charts for his destination and alternate airport minimums. If an airport is not authorized for use as an alternate, the letters "NA" will follow the symbol.

However, once a pilot decides to land at an alternate airport, he disregards the alternate ceiling and visibility minimums. In other words, when the alternate airport actually becomes his airport of destination, the pilot uses the normal landing minimum appropriate to the type of landing procedure he will follow. ("Normal" landing minimums involve only the visibility in conjunction with the published DH or MDA.)

Straight-in minimums are shown on instrument approach procedure charts only when the final approach course is within 30° of the runway alignment and a normal descent can be made from the specified height, either DH or MDA. Otherwise, a circling MDA applies. However, even though a straight-in minimum is not published, the pilot may land straight-in if he has the active runway in sight in ample time to make a normal landing. Under these conditions, once Air Traffic Control has cleared him for landing on that runway, he is not expected to circle. If he desires to circle at a controlled airport, he should so advise the tower.

Pilots should not descend below the circling altitude until ready to begin their final landing descent. Although the circling pattern will vary according to airport topography, the following basic rules apply:

1. Maneuver the shortest path to the base or downwind leg as appropriate. There is no restriction to passing over the airport or other runways when cleared for a landing.

2. Standard left turns or specific instruction from air traffic control must be followed, with the expectancy that VFR flying may be in progress at the airport.

3. The airport may be overflown when necessary to determine wind and turn indicators and local traffic.

Follow Instructions Carefully

Pilots engaged in IFR approaches or departures should pay careful attention to instructions from Air Traffic Control and to their environment. For example, if the procedures states "Climb to 2,400 turn right," it means climb to 2,400 feet *before* making the right turn (normally to clear obstacles) —this is not a climbing turn to the right. If the latter is conducted, responsibility would remain with the pilot to ascertain that the maneuver can be performed without danger to himself and others.

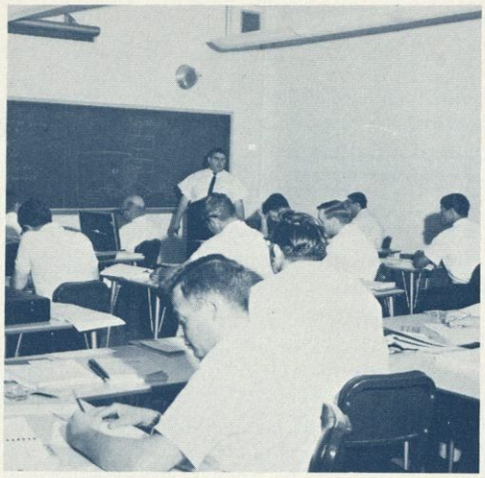
All pilots, whether instrument-rated or not, are advised to familiarize themselves with the new charts.

Complete details on their use are contained in the FAA Advisory Circular 90-1A, "Civil Use of U.S. Government Instrument Approach Charts," available without charge from TAD 484.3, Department of Transportation, Washington, D. C. 20590.

Don Byers

FAA Academy Laboratories
Simulate Traffic Problems

Controller College



Above—air traffic control trainees get intensive training in aircraft characteristics, communications, weather and FARs. **Right**—FAA's Aeronautcal Center, Oklahoma City, Oklahoma.

(Editor's Note: Part I of this article, which appeared last month, described how trainees are selected and brought to the FAA Academy for air traffic controller training. Part II describes the type of training they receive, and the professional opportunities open to air traffic controllers.)

Three separate basic courses have been developed by the Academy to prepare air traffic specialists for FAA's three different types of air traffic control facilities.

An "En route" course has been developed for new controllers who will staff the 21 air route traffic control centers which are responsible for all IFR air traffic that flies within the controlled air space. A "terminal" course has been developed for men who will control airplanes from towers located on more than 300 of the nation's airports, and the "flight service" course has been planned for the men who will provide flight assistance to the nation's general aviation pilots at over 340 flight service stations.

All pilots who fly IFR within controlled areas come under mandatory control of an air route traffic control center. Controllers who work in these centers provide safe separation visually from the time an aircraft is approximately 30 miles from his departure airport until it is within about 30 miles of its destination.

Students receive their first "working" training in simulation laboratories outfitted with elaborate air traffic control consoles replete with charts, flight data boards and headsets. They begin by learning the basics of non-radar separation, including longitudinal, latitudinal and vertical separation.

They also receive a thorough grounding in all of the basic functions of an air route traffic control center; radio transmissions to airmen, flight strip reading and processing, weather analysis, clearance forwarding, etc. Actual radar work is reserved for later experience in the facility.

The nine-week terminal controller training course has been planned to familiarize students with procedures performed in five basic positions in the airport control tower: clearance delivery, ground control, local, departure and approach control.

Since it is impractical to bring a class of 20 to an airport tower to practice directing traffic, the tower, in a sense, has been brought to the students in the form of a classroom equipped with tower consoles. Students, outfitted with headsets, control mock air traffic on video tape. Wall-size rear screen projection equipment is used to bring landing, departing and taxiing aircraft "into the classroom." Flight strips on the students' consoles provide basic information about each traffic problem. Communications taped from simulated pilot-to-tower transmissions are directed to students who practice the proper responses. Errors are incorporated into some of these transmissions which students learn to catch by paying careful attention to their flight strips.

At first students handle small simply equipped aircraft with relatively slow airspeeds. As they gain experience, larger and more complex aircraft are added to their problems, and then the two are mixed together to provide realistic traffic problems.

Students also learn to read weather reports, follow communications procedures and use proper air traffic control phraseology. They learn the effects of weather on flight, and the different needs of VFR and IFR traffic in poor weather conditions. They also memorize performance characteristics of aircraft, and learn to recognize different makes and models. The FARs that apply to their jobs are carefully assimilated.

For enroute and terminal controllers, their nine-week FAA Academy training is only the beginning. Depending on the complexity of the facility to which they will be assigned, controllers must take two to three years additional on-the-job training before they qualify as full-fledged radar controllers.

Students learn by doing, using actual equipment they will later encounter in their work. This teletype class is encoding and typing messages.

The flight service specialist, on the other hand, receives the major portion of his FAA training at the Academy. His course is longer —14 weeks in all—to familiarize him with every position in a flight service station.

The student is taught meteorological symbols so he can understand and translate weather reports from teletype machines. He learns to read weather instruments that indicate velocity and direction of the wind and barometric pressure. He learns how to judge visibility and ceiling and how to describe storms in terms that all pilots understand.

A mock flight service station, equipped with the hardware used in all positions, helps the student learn to operate the standard communication equipment found in stations —weather reading instruments, teletypewriters, radios, direction finding equipment. He learns how and and when to broadcast weather conditions and flight advisory notices to pilots aloft, how to answer specific questions posed by pilots, and when to solicit pilot reports on weather aloft.

This is "Controller College", containing 34 classrooms, where air traffic control students learn ABCs of the National Airspace System.

Completely modern classrooms and laboratories enable instructors to give individualized instruction. Here students are learning to receive aircraft-to-tower radio transmissions.

Certificate of training in hand, the FSS trainee is sent to a flight service station in the region of his choice, where he immediately takes on responsibilities as a flight service specialist. After he learns the prevailing weather, terrain and navigational characteristics of his assigned locale, he is ready to become a contributing member of his FSS team.

Working with older, more experienced flight service specialists, he soon learns to give proper preflight briefings to pilots who call or come in to his station. Later, when his experience has broadened, he will have an opportunity for more dramatic work, such as giving flight assists to lost or disoriented pilots. As he becomes more proficient and develops judgment, he will be promoted to higher grades with greater responsibility.

Academy courses prepare students to fulfill their duties in task-oriented "phases," each phase followed by an examination. A student must receive a grade of 70%, based on 100, to pass each phase.

The final exam, given at the close of the nine or fourteen week training period, covering all the information studied, contains questions in seven subject areas. Every student must pass every one of the seven parts. If a student fails more than two parts, his case is brought before the Air Traffic Student Review Board, which may recommend the student's removal from training. If a student has failed no more than one or two subjects, he may retake the exam after five hours of special tutoring in each subject. If he passes, he may graduate with his class. If he fails, he is subject to removal from training.

Most students who are able to pass the aptitude test can master the air traffic control concepts, but some find they are unable to withstand the pressure that develops in the laboratory when air traffic controlling is practiced.

There is no recourse at the Academy for the man who fails—he may not "wash back" into another option; if one became the dumping ground for failures from the others, professional pride would suffer.

The man who "washes out" at the Academy returns to the region where he was hired and if no other opportunity exists for him there, his separation is handled by that personnel office.

Training never really stops for the air traffic controller. As soon as he is assigned to a facility, he must be area rated—that is, learn the geographical and weather peculiarities of his area. Then he begins "qualification" training, or training in handling more complex tasks. With promotion he is subject to periodic proficiency testing.

When the non-radar en route controller is ready for radar training, he is returned to the Academy at Oklahoma City for three-weeks for advanced radar qualification training. After more area rating in this complex job, he can begin working in an unsupervised position (subject to periodic proficiency testing).

Each time a specialist moves to a busier or more complex facility, he is subjected to area rating and "apprentice" status until supervisors feel he is ready to handle the separating responsibility on his own.

While most air traffic specialists begin at Grade 7, earning a salary of about $6,900, they qualify for promotion to Grade 9, an increase to about $8,400 only six months later. Within 18 months of their first day of training, they will be eligible for another promotion to grade 11, earning about $10,000 a year. Civil Service regulations provide for substantial yearly increases for all whose work is satisfactory. Radar controllers can expect to earn $15,000 or more per year after five years experience.

Air traffic control work opens the door to many important administrative roles in interesting aviation jobs. Many top FAA personnel, including Acting Administrator David D. Thomas, began as controllers.

Air traffic experience has also led to important careers in a variety of aviation-oriented industries—airlines, aircraft manufacturing and airport management.

A growing number of women have advanced to highly responsible posts in air traffic work.

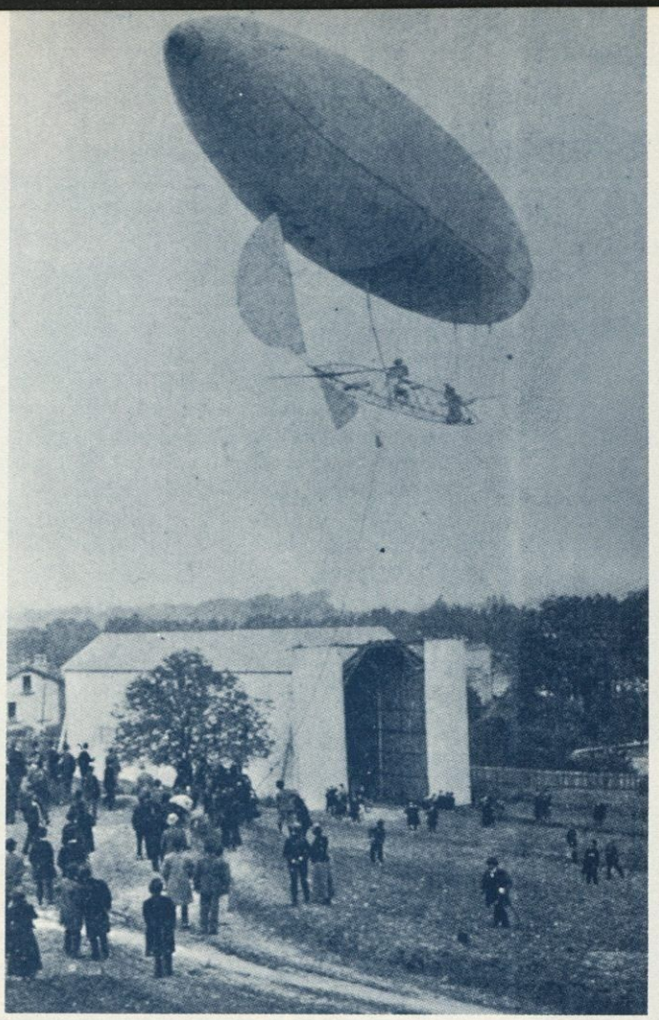
In the years ahead, as aviation continues to expand and dominate the field of public transportation, the possibilities for service and distinction for the young men and women now entering the FAA Academy at Oklahoma City as air traffic control trainees are virtually unlimited.

Nancy Koplinka

famous

FLIGHTS

AIRSHIP AWAY!



Left—Airship No. 6, with Santos-Dumont aboard, is guided to the starting point on Oct. 19, 1901, to begin his race against the clock to win the Deutsch prize of 100,000 francs for flying from St. Cloud to the Eiffel Tower and back in 30 minutes. **Above**—Santos-Dumont crouched in his experimental lightweight powered glider.

Before piloting could develop as a technique, one had to have an aircraft that would stay up in the air long enough for a man to master the art. For more than a century before the Wright brothers taught themselves to fly, aeronauts were sailing through the skies in lighter-than-air craft, more or less controllable. The first man who could properly call himself a pilot was Alberto Santos-Dumont, a Brazilian, whose winning of the "round the Eiffel Tower" prize in 1901 established him as the foremost aviator of his time.

This was the first pylon race on record, and it was a race against the clock. Donor of the prize (100,000 francs), Henri Deutsch de la Meurthe of the Paris Aero Club, stipulated that an airship must be flown from St. Cloud (a Paris suburb) around the Eiffel Tower and back to the starting point within 30 minutes. The course was seven miles, requiring an average groundspeed of better than 14 mph.

A good bicyclist could have covered the course in half the time, but in this infantile stage of aviation there was only one man in all the world who was capable of even making a good try for the Deutsch Prize, and that was Santos-Dumont, a wealthy amateur scientist for whom aviation had become the sole passion of existence.

Although ballooning had been popular in France for a hundred years before Santos-Dumont settled in Paris in 1897, no one had invented an airship that could be maneuvered dependably. Spherical balloons had been superseded by cigar-shaped airships designed by aviators seeking horizontal directional control; and all kinds of "airscrews", from steam to electric powered, had been mounted in the gondola. But the basic problem of deriving enough power without overburdening or otherwise unbalancing the lifting device remained unsolved.

Dumont was not the first man to use an internal combustion engine in an airship, but he was the first to persist in experimenting with gasoline engines until he found a design that worked. From 1898 to 1909 he designed and built 22 aircraft, most of them lighter-than-air, some hybrid monsters half-airship and half-airplane, but also some pusher and tractor biplanes, monoplanes and hydroplanes. It was his Airship No. 6 that brought him world fame and the 100,000 francs of the Deutsch Prize.

Bicycle Seat at 10,000 Feet

Along with the wealth needed to build airships, Santos-Dumont was naturally endowed with an advantage over other aeronauts who were struggling with the power-versus-weight/lift problem: he weighed only 125 pounds, and he flew alone. Furthermore he built his airships of the lightest possible material, including bamboo and piano wire, perching himself sometimes on nothing more than a bicycle seat to soar two miles high in the air. His No. 6 was a semi-rigid airship, just over 100 feet long, with a narrow beam and a girder keel of lightweight aluminum. His 20 hp gasoline engine weighed about 200 lbs. Lift was supplied by 622 cubic meters of hydrogen. Horizontal thrust was provided by a wooden propeller 12 feet in length, founted in front of a large rudder aft of the "cockpit", which consisted of a tiny wicker basket.

In practice flights, Santos-Dumont soon learned that the advice of fellow aeronauts had to be largely discarded if he were to master his craft. The prevailing belief in starting an ascent downwind, for example, cost him a wrecked airship, before he realized the advantage of taking off into the wind.

Like other early aviators he had to spend much of his flight time fussing with a balky engine. The sight of the diminutive Dumont crawling out over the flimsy framework of his airship to wrench away at a smoking engine, while his ship fluttered like a leaf in the wind over the chimney-tops of Paris became a common, if incredible, sight.

Weather was also a problem. With marginal power, Dumont had no hope of winning the Deutsch Prize on any but a near calm day. After several embarrassing failures, in which winds sprang up and blew him far off course, he managed to assemble the race committee on a calm afternoon (October 19, 1901), and gave his familiar cry to the men holding the tiedown ropes: "Let go all!"

With the wind behind him, Dumont whizzed down on the Eiffel Tower and rounded it within ten minutes of his start.

As he started back, into the light wind which had now sprung up, his beloved engine began to misfire and slow down. The airship began to drift off course. Dumont had to abandon his controls and clamber out, foot by foot, hand by hand, along the slender spars of the girder keel, a thousand feet over the city. Below him Paris was in a furor, as thousands of faces turned upward, traffic came to a standstill, and people poured out onto the streets.

Reaching the engine, just as the airship was starting to stand on her nose (due to the shift in weight) Dumont calmly adjusted the fuel mixture until the engine picked up. Then he scrambled back to his "cockpit" and righted the airship.

Missed Prize by 40 Seconds

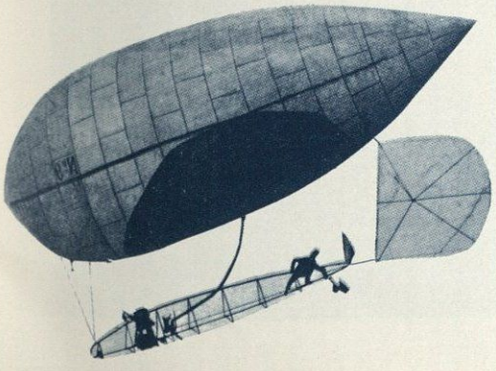
All Paris shouted encouragement. Dumont's little engine putt-putted him back to St. Cloud just as the stop watches came to the 30 minute mark. Amidst cries of "Victory! Victory!" from Dumont's supporters, a race official informed him sadly, "You have missed the prize by 40 seconds."

But the mood of Paris was such that Dumont could not be denied, and the race committee had to reverse itself and award Dumont the prize. Grandly, he ordered the 100,000 francs distributed among the Paris poor.

Dumont went on to build other airships and gain such mastery of piloting that he could fly over the Champs Elysée in Paris, select an open air cafe, land beside it for an aperitif and take off again without any apparent effort. He tried his hand at all manner of aircraft, ornithopters, and lift devices, including an individual motorized ski-climbing device which he offered to the Swiss. He wrote a book, expanding on the principles of flight which he had developed after patient years of trial and error and courageous endeavor. He was honored throughout the world for his pioneer achievements in powered control of flight, and he was glorified in his native Brazil.

Ironically, Alberto Santos-Dumont, who loved his airships because they took him into a realm of peace and serenity, lived long enough to see aircraft of his design used for military bombardment in a civil war on his native soil. The sight was too great a shock for his sensitive nerves, and in despair he took his own life. The year was 1932.

—Lewis Gelfan



BRIEFS

• OLD BIRD, NEW FEATHERS. If you look aloft and think you see an ancient Ford Tri-Motor lumbering across the sky, full out at 140 mph, you are right—in a way. FAA recently certificated the Bushmaster 2000, a much modernized version of the old "Tin Goose" which first went into service in 1926 and is credited with being America's first mass-produced air transport. The new Bushmaster retains the old silhouette, except for a dorsal fin, but has larger and more powerful engines, full feathering props, and a lighter gauge aluminum structure. It can take off in 850 feet over a 50-foot barrier.

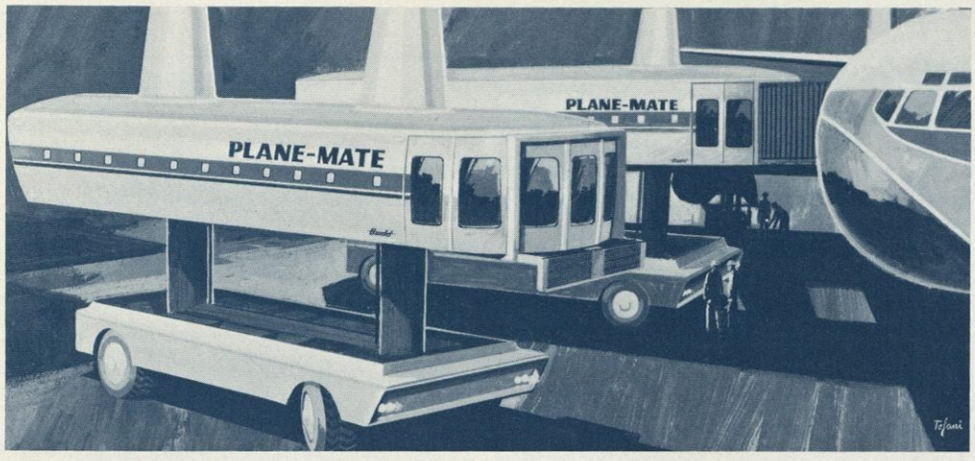
• THE BROWNSVILLE CHART is the 11th and latest in a new series of 37 U. S. Sectional Aeronautical Charts now available from the Coast and Geodetic Survey for 50 cents each. The Brownsville chart covers the southeastern tip of Texas and portions of northeastern Mexico. The new family of charts is printed back to back, to the edges of the sheet, on a common line for easy transition from one side to the other. All 16 of the new charts covering Alaska are also available.

Other charts in the new format are: Miami and Jacksonville, Fla., Charlotte, N. C., Washington, D. C., Los Angeles, Albuquerque, El Paso, San Antonio, Houston, and New Orleans. The entire U. S. series is expected to be completed by the end of 1969. Charts may be ordered from the U. S. Coast and Geodetic Survey, C44, Rockville, Md. 20852, and from U.S. Coast and Geodetic Survey Authorized Aeronautical Chart Agents.

• THERE IS ANOTHER JOHN F. KENNEDY AIRPORT, this one 13,307 feet above sea level in the Andes, serving the city of La Paz, Bolivia. The name became official during ceremonies dedicating the modern airport terminal building. The airport is expected to be ready for public use by mid-1969. The ceremonies were attended by Bolivia's President, Gen. Rene Barrientos Ortuno, and the Honorable Raul H. Castro, U. S. Ambassador to Boliva, and other high government officials.

• OFFSHORE AIRPORT SITES will be examined by FAA as a possible solution to skyrocketing costs of land for airports, and mounting objections to aircraft noise by neighbors of existing airports. FAA is studying proposals on the engineering, economic and operational aspects of constructing offshore airports. Proposed methods of construction of aquaports include (1) floating airports, (2) those built on land fill, (3) those built on piles, and (4) those built in areas protected by dikes. Offshore airports have been proposed before but FAA sees a need for more detailed analysis and correlation of all such plans.

• VETERANS TAKING FLIGHT TRAINING under the G. I. Bill are now receiving payments from the Veterans Administration monthly, rather than every three months. The last quarterly checks went out in December 1968.



AIRCRAFT LOADING SIMPLIFIED BY NEW VEHICLE

A new entry in the field of devices for easing the passenger's transition between aircraft and airport terminal is now available.

"Plane-Mate" is a self-propelled lounge made by the Budd Company of Philadelphia which made the mobile lounges for Dulles International Airport. The vehicle can carry 100 passengers in air-conditioned comfort from terminal to aircraft. The passengers ride in a pod, which can be elevated and lowered to match aircraft doorsill heights between 5½ feet and 18½ feet. The vehicle can travel at a maximum speed of 19 mph and can elevate the pod to full height in less than a minute.

The Plane-Mate is designed to accommodate all present and proposed passenger jet aircraft, including the DC-9, Boeing 737, BAC 111, DC-1, Lockheed 1011 and the Boeing 747. Passengers and cargo can also be loaded at ground or second level portals.

Because of their mobility and ability to operate in three dimensions, vehicles such as Plane-Mate make design of terminals less difficult in attempting to plan for current and proposed aircraft.

Business Jet Spiral Dive Hazard Under FAA Study

FAA has awarded a $125,000 research contract to the Cornell Aeronautical Laboratory to investigate high-speed flight characteristics of business jets, with particular emphasis on learning more about inadvertent spiral dives and the accompanying build-up of excessive speed.

Termed spiral divergence and upset-overspeed, the first gives rise to the second, each increasing in intensity as duration increases. Spiral divergence is believed to have been a contributing factor in a number of business jet accidents.

Almost all aircraft, propeller or jet propelled, will not recover from a descending spiral without pilot assistance. During VFR conditions, a pilot's normal reactions automatically correct aircraft attitude changes as they occur. But during IFR conditions, when there is no external horizon reference, and when the pilot may be occupied with instrument navigation problems, a spiral can develop and continue undetected for long periods. With very clean high-speed jets, excessive airspeed and steep bank angles can develop rapidly.

Cornell engineers will use an Air Force T-33 specially modified to create various unstable conditions. The test pilot experiences the stability and control characteristics of the airplane being simulated, and not those of the T-33. A safety pilot rides along to disconnect the variable-stability system and recover the airplane.

Information developed from the program, while intended primarily for the design and certification of smaller jet aircraft, will also be applicable to jet transports.

Aircraft Mechanics Now Training in Colleges

The chronic shortage of qualified aircraft powerplant mechanics is now being attacked from an unexpected direction. Some junior colleges are now offering aviation mechanical trades courses.

The latest to add training in aircraft propulsion systems is Everett Community College, Everett, Wash., which now has the 100th such training program authorized by FAA or previously by the Civil Aeronautics Administration. The college plans to add a course in airframe mechanics.

The courses are designed to enable students to qualify for FAA certification either as powerplant or airframe mechanics, or both. With additional courses, a student may earn the Associate in Technical Arts degree conferred by the college.

Everett Community College already has in operation a two-year commercial pilot training curriculum, including ground school coordinated with flight training.

FAA and Industry Undertake Major Rewrite of Heliport Design Manual

Keeping pace with the rapid onrush of helicopter design and operation concepts, FAA is completely revising its Heliport Design Guide, which first appeared in 1964 and has remained unchanged since then.

The new edition, expected to be available soon after July 1, 1969, is proposed to include new information on such topics as IFR operations at heliports, marking and lighting, blast effect, noise, special requirements for elevated airports, land use and zoning for heliports, and data for new helicopters and proposed vertical takeoff and landing (VTOL) aircraft.

New Synthetic Runway Surface

A new runway surface that promises antiskid characteristics is being evaluated at Meigs Field, a general aviation airport at Chicago's Lake Michigan.

Manufactured in Denmark, "Sinopal" is a rough-textured, extremely hard synthetic aggregate composed of 65% glass sand, 25% high calcium limestone, and about 10% dolomite. The mixture is heated to 3,000°F. and then cooled and hardened. In a second kiln it is processed into popcorn-like bright-white stones. Sinopal is mixed with asphalt which is applied to the surface of the runway.

In addition to increasing tire friction, the bright-white stones are said to diffuse the glare of headlights, especially at night and in the rain, improving forward visibility.

The man-made aggregate has been used for many years to improve skid resistance and visibility on European highways.

The stones, which test at 7.5 on the hardness scale (diamonds are the highest at 10), do not polish smooth like roadstone, a commonly used aggregate, which measures only 3.5. However, the surface must be worn by several months of use before the synthetic stones are exposed so as to add any friction to the surface.

FORUM

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• A Flying Career For Him

I am interested in training for a commercial pilot position. Could you please send me a list of FAA approved schools in my vicinity? I would also appreciate any other information in regard to obtaining a private and commercial license.

Ronald J. Hlavaty
Stamford, Conn.

FAA's Advisory Circular AC 140-2D "List of Certificated Pilot Flight and Ground Schools" has been sent to you. Requirements for private and commercial licenses are detailed and explained in the following FAA Advisory Circulars, obtainable at the prices indicated from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402: AC 61-2A "Private Pilot, Airplane, Flight Training Guide" $1.00; AC 61-2B "Flight Test Guide, Private Pilot, Airplane, Single Engine" 20 cents; AC 61-28 "Commercial Pilot Examination Guide" 75 cents; AC 61-32 "Private Pilot Written Examination Guide" $1.50; AC 61.117-1B "Flight Test Guide, Commercial Pilot, Airplane" 15 cents.

• Daring Young Man on the Flying Trapeze

My hair stood on end this summer when I saw acrobats performing high over a crowd while suspended from a helicopter. I suppose they know what they are doing, and I further suppose all involved had the necessary waivers required for operation under FAR 133. But, to satisfy my own curiosity, what would be required to carry aerialists under these circumstances?

Norman Winfield
Scranton, Penna.

A waiver of FAR 91.39(d), General Operating and Flight Rules, would be required. The operator would have to apply in advance to the local GADO.

• Printing, Production, Paper, Postage

Round numbers make my check book easier to balance, but how come the price rise from $1.50 to $2.00 for *Aviation News?* As long as I can remember, the magazine cost only $1.50 a year.

F. J. C.
Rockville, Md.

It's true, ever since FAA Aviation News *made its appearance in 1961, the subscription price has been $1.50 for 12 issues and 15 cents per single copy. But that was almost eight years ago. In the interim, everything has gone up, particularly printing, production, paper, and postage. Like other government publications, FAA* Aviation News *has undergone a price increase which will cover the cost of production, hopefully for the next half dozen years.*

• Accident Clue?

On reading the article "Accidents Can Be a Warning" in the October 1968 FAA *Aviation News* it occurred to me that a review of the driving license of pilots involved in a flying accident would reveal if they were accident prone. This should be easy to check, since highway accidents are a matter of record and most pilots are drivers before taking up flying.

If investigation showed a poor driving record, the candidate for a pilot's license should be required to demonstrate his competence on land before venturing into the blue.

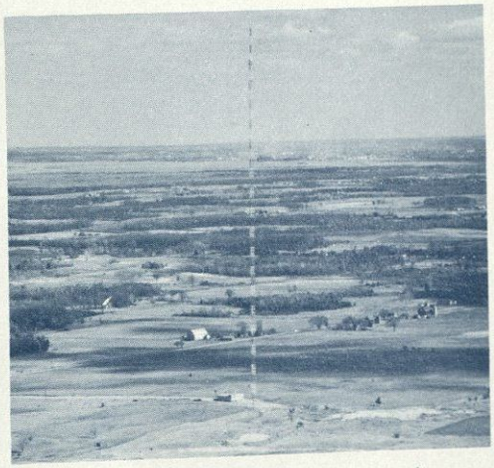
Joseph O. Johnsen, Sr.
Glen Ellyn, Ill.

FAA does have access to the National Driver Register. However, the number of man-hours required to check all pilots against the National Drivers Register is believed to be so substantial as to cause serious delays in the issuance of certificates. Therefore this procedure has not been considered practicable.

• Conspicuity

Guy wires supporting TV and radio transmitting towers do occasionally snare aircraft, as you pointed out in "Identifying Flight Obstructions" in the September 1968 *FAA Aviation News.* I would like to suggest that such tall towers be circled by concentric rings of white stones, giving the effect of a bull's-eye rifle target. Grass strips between the stone rings would make them stand out even more.

Illinois



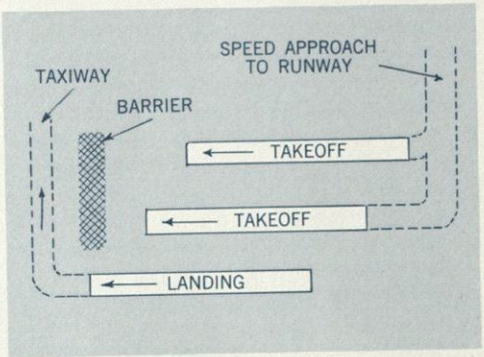
The idea of ground markings around towers was studied by FAA's predecessor, the Civil Aeronautics Administration in 1955-56. The high cost of installation and upkeep doomed the project. As the conspicuity of these towers is much less during daylight hours, FAA is currently completing a project using high-intensity lights day and night to identify and assist in locating them.

• Triple Runways?

If dual parallel runways are good, wouldn't three such runways be even better? Here is my plan to speed up jet takeoffs and landings: the two runways on the right would have high-speed runway approaches and would be used for takeoffs. The runway at left would be used for landing only, with a highspeed turnoff at the end of the runway.

Fremont, Calif.

Optimum capacity is achieved by using parallel runways with high speed exit taxiways. Your design, omitting the intervening taxiways, would require a landing aircraft to make full use of the entire runway before it could exit at the end of the runway. This would cause a disadvantageous delay in clearing the runway.



• CAM 18 is Alive and Well

Aviation News I'm surprised at you! You told reader Lloyd W. Turnipseed, Jr., that the famed Civil Air Manual 18, the highly regarded "mechanic's bible", was dead. It's true that the government no longer prints it, but it has been reprinted by the Experimental Aircraft Association, P. O. Box 229, Hales Corner, Wis. 53130. Price: $3.00, plus 20 cents for postage.

George Hay
Arcata, Calif.

• Fly Me to the Moon

I am concerned about the present rash of airplane hijackings to Cuba. Since the pilot's cabin can be locked, how about a system to release knockout gas into the passenger cabin? Then the hijackers can be tied up. The gas will wear off quickly and everything returns to normal.

Winston-Salem, N. C.

Your solution might be more dangerous than the situation it seeks to remedy. The passengers aboard a typical airliner represent a cross-section of the population—the old and the young, the healthy and the ill—and a quantity of gas strong enough to render a person unconscious might induce severe illness in others and perhaps even cause death.

By the way, who would be left awake to do the tying?

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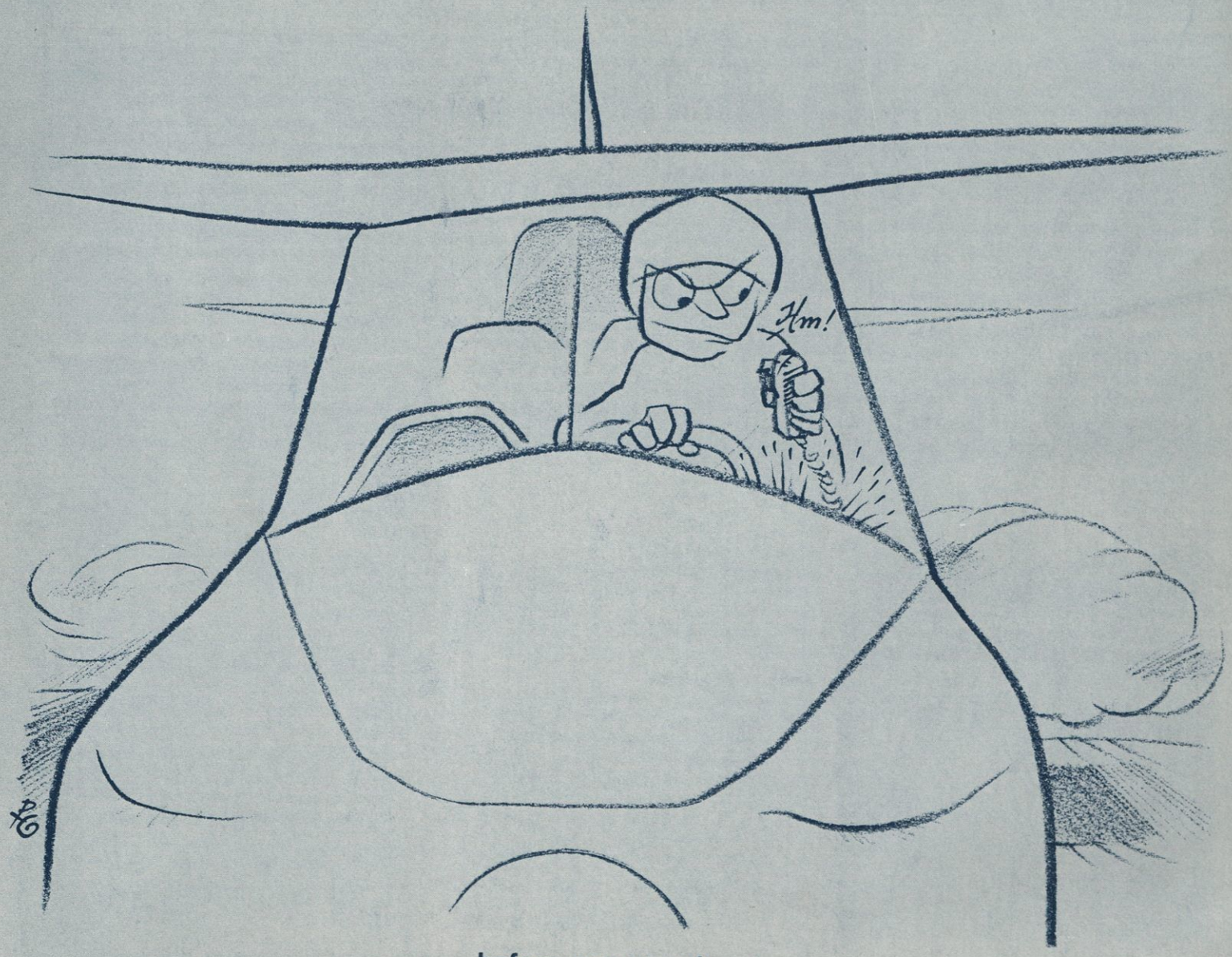

before you speak.

Suggested by L. C. Larkin